

# PATENT SPECIFICATION

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## (54) CONTROL MEANS FOR A MOVEMENT-TRANSMISSION MEMBER

(71) We, BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT, a German Body Corporate, of BMW-Haus, Petuelring 130, München 40, German Federal Republic, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

5 This invention relates to control means for a movement-transmission member such as a Bowden cable or a connecting rod, comprising a lever adapted to swing about a fulcrum and to which the movement-transmission member is connected in use of the control means.

10 In one proposed form of control means of this construction, not in accordance with the present invention, the control member is a lever containing an offset cam slot which engages a follower roller rotatably mounted on a pin on the transmission lever and which is retained in one end position by the deformation of an elastic component. Fixed 15 intermediate positions cannot be selected without the provision of special accessory arresting devices.

15 It is an aim of the present invention to provide control means which operate smoothly and which, by adjustment of the rotary control member, can be sensitively set to any desired angular position in such a way that it will remain in this position without being displaced of its own accord. A 20 further aim is that the contemplated control means should be simple, inexpensive to produce, and capable of being fitted in a motor vehicle without taking up much space.

25 With these aims in view, the invention is directed to control means as set forth in the opening paragraph of this Specification, further comprising a disc which has a cam surface in each of its side faces and which is 30 rotatably fast with a rotatable control member of the control means, the cam surfaces being in register with one another and the lever carrying two lugs defining a "U" which embraces the disc from the edge, each lug carrying a pin projecting inwards and engaging one of the cam surfaces, and the cam surfaces each comprising a spiral extending in arcuate manner around the axis of rotation of the control member, the angular pitch of each cam surface lying within the 35 limiting angle of friction.

35 The spiral shape of the cam surfaces associated with the control member for operating the lever provides a one-way kinematic transmission and prevents any possible displacement due to vibration or other external effects. Reactive forces which are generated by a controlled component, such as an air flap in a vehicle heater system, and which are retransmitted to the control member cannot change the existing position of adjustment because the frictional forces generated against the cam surfaces increase in proportion with the magnitude of the transmitted force. The spiral cam surfaces 40 permit the control member and hence a controlled member to be sensitively adjusted. The functional relationship between the angle of rotation of the control member and the positional displacement of the transmission member can be arbitrarily chosen by a suitable choice of the shape of the spiral and of any further cam portions extending the spiral, and thus adapted to the particular purpose in view. The cam surfaces may be of cam slots which are endless or open at each end, and which may extend around any angle of rotation, even exceeding 360°.

45 Preferably cam slots of rectangular cross-section are provided in the side faces of a disc which is rotatably fast with a control member constituted by a knob. More particularly, the disc is provided with a cam slot in each side face, and the lever carries two lugs defining a "U" which embraces the disc

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from the edge, each lug carrying a pin projecting inwards and engaging one of the cam slots. This ensures expensive production of the control means and provides 5 compactness for installation in a motor vehicle as well as a symmetrical disposition of the transmission means to ensure a desirable flow of forces through the cooperating parts.

10 Normally the knob, the disc and the lever will be injection-moulded plastics components.

15 Control means in accordance with the invention are shown by way of example in the accompanying drawing, in which:-

Figure 1 is a general view of the control means; and

Figure 2 is a section taken on the line II - II in Figure 1.

20 The illustrated control means are designed to be fitted in the instrument panel 1 of a motor vehicle and comprise a rotatable knob 2, a disc 3 and a lever 4 to which a Bowden cable 5 is attached. The rotatable knob 2 projects through a hole in the instrument panel 1 and is mounted in a housing attached to the back of the instrument panel. The disc 3 is keyed at 8 to the shaft 7 of the knob 2 for common rotation therewith. On the side faces 9 and 10 of the disc 3 there are identical rectangular section cam slots 11 and 12 respectively.

25 The lever 4 which pivots on a pin 13 in the housing 6 is formed with two lugs 14 and 15 which together define a "U" embracing the disc 3 from its edge. A pin 16, 17 projecting inwards from each lug in a direction parallel to the shaft 2' of the knob 2 engages one of the slots 11 and 12 with clearance. The cable 5 of a Bowden gear is attached to the free end 18 of the lever 4. The cable sheath 19 extends substantially tangentially to the circular path of the point of attachment 20 of the cable to the lever 4 when the latter 30 swings about its pivot 13. Consequently the cable 5 will be subjected to minimal deformation by bending during operation. The point of attachment 20 of the cable 5 to the lever is central with reference to the two lugs 14 and 15 and the disc 3. The forces 35 acting on the side faces 9 and 10 of the disc 3 will therefore be exactly symmetrical. The pins 16 and 17 will not therefore tend to jam in the slots 11 and 12.

40 The planar cam transmission thus formed generates a substantially linear movement of the cable 5 when the knob 2 is rotated by hand. In the end position shown in Figure 1, the pins 16 and 17 have reached the outer 45 end of the cam slots 11 and 12 which extend through an angle of about 270°. In the illustrated position the pins 16 and 17 make contact with a terminal stop 21 on the disc 3. If the knob 2 is rotated in the clockwise direction, the lever 4 is deflected anticlockwise and withdraws the cable 5 from its sheath 19 until the pins 16 and 17 reach the inner end of their respective cam slots 11 and 12. The pitch of the spiral defined by the cam slots 11 and 12 is chosen with due regard to the friction in all parts of the transmission so that the limiting angle of friction will not be exceeded and the transmission will remain in any position of adjustment and cannot of its own accord move.

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WHAT WE CLAIM IS:-

1. Control means for a movement-transmission member such as a Bowden cable or a connecting rod, comprising a lever adapted to swing about a fulcrum and to which the movement-transmission member is connected in use of the control means, a disc which has a cam surface in each of its side faces and which is rotatably fast with a rotatable control member of the control means, the cam surfaces being in register with one another and the lever carrying two lugs defining a "U" which embraces the disc from the edge, each lug carrying a pin projecting inwards and engaging one of the cam surfaces, and the cam surfaces each comprising a spiral extending in arcuate manner around the axis of rotation of the control member, the angular pitch of each cam surface lying within the limiting angle of friction.
2. Control means according to claim 1, in which the cam surfaces are provided by cam slots of rectangular cross-section.
3. Control means according to claim 1 or claim 2, in which the control member, the disc and the lever are mouldings made of a synthetic plastics material having a low coefficient of friction and a high resistance to wear.
4. Control means according to claim 1 substantially as described herein with reference to the accompanying drawings.
5. Motor vehicle mechanism incorporating or connected to control means as claimed in any preceding claim.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*

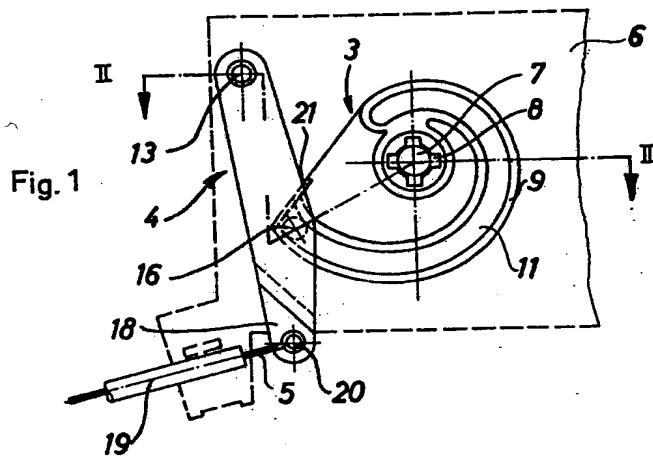


Fig. 2

